Supplementary Material

Propagation of mechanical stress through the actin cytoskeleton towards focal adhesions: model and experiment

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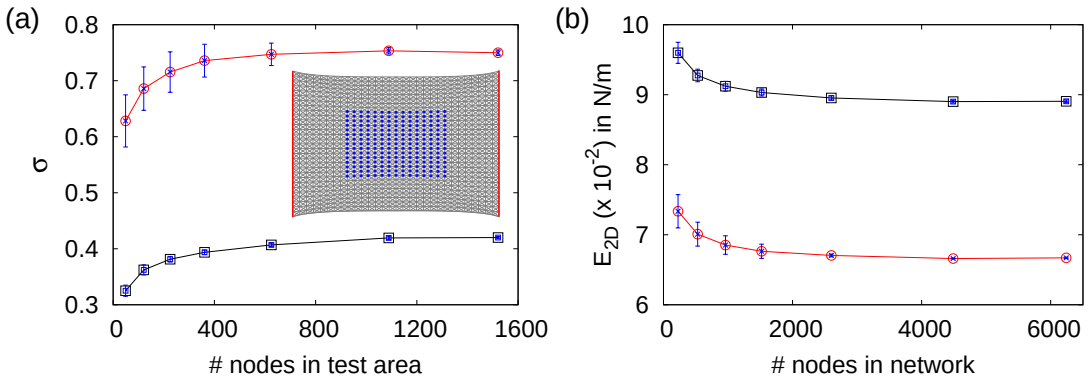

FIG. 1: (a) Effective Poisson ratio σ and (b) effective two-dimensional Young modulus E_{2D} for the reinforced square network as a function of the number of nodes in the test region. In both cases, red and blue curves are for networks without and with prestrain, respectively. Thus prestrain decreases σ and increases E_{2D}. The inset shows the deformed network and the test region in the middle.

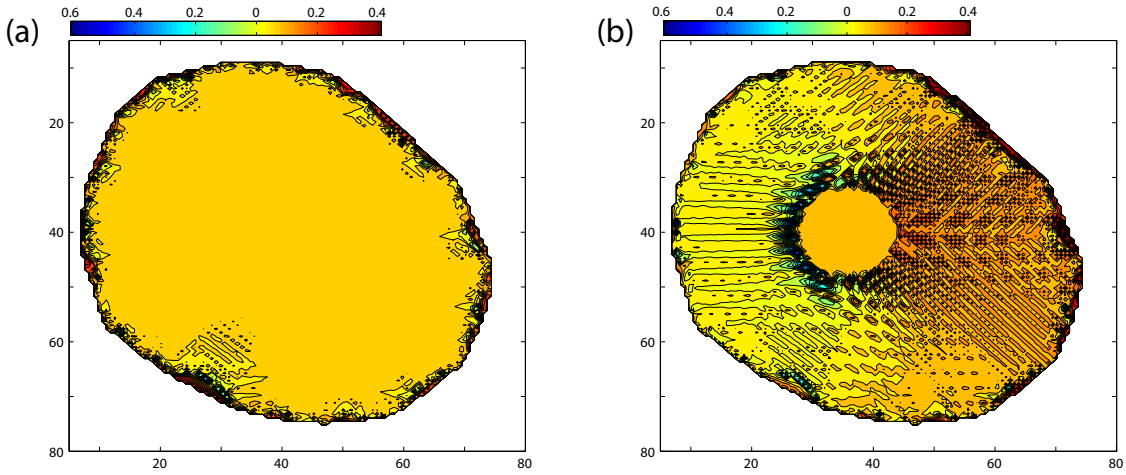

FIG. 2: Strain distribution over the entire cell for the adhesion geometry analyzed in Fig. 5 of the main text. (a) correspond to the prestressed cell before pulling and (b) represents the same cell after its CSK is pulled to the left. Red refers to large extension while blue represents large compression.

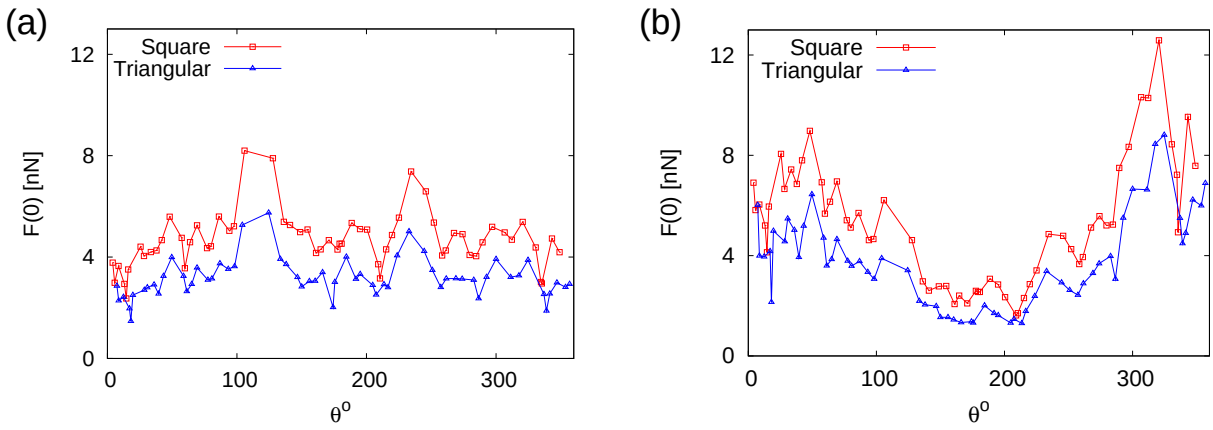

FIG. 3: Predicted forces at adhesion points for the cell analyzed in Fig. 5 of the main text (a) before and (b) after pulling plotted as a function of the angle θ. The lower and upper curves correspond to the simulation results obtained from triangular and square lattices, respectively, and agree well.

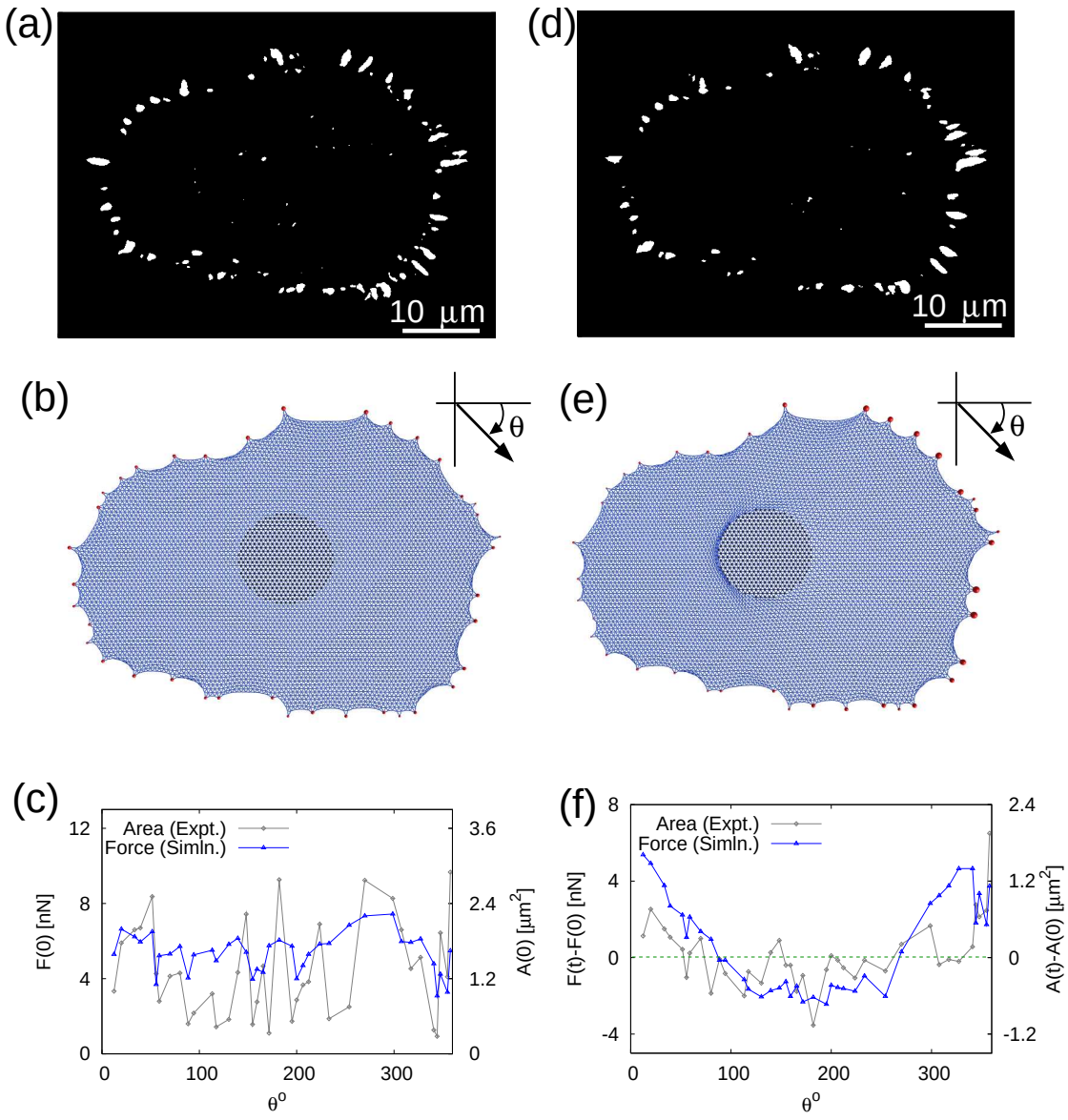

FIG. 4: Comparision of experiment and model predictions for a second set of data. (a) and (b) are the experimental and simulation snapshots of the prestressed cell before pulling, respectively. (c) In order to compare experiment and simulation, we assume that the size of the experimentally measured FA area is proportional to the pulling force on it. The blue line represents the forces at the adhesions predicted by the computer simulations and the gray line represents the experimentally measured areas of the contacts (RMSD = 2.40 nN). (d-f) Same data but 10 min after the pillar has been laterally shifted to the left. In (f), the differences in forces and areas are shown relatively to the situation before pulling (RMSD = 2.24 nN).

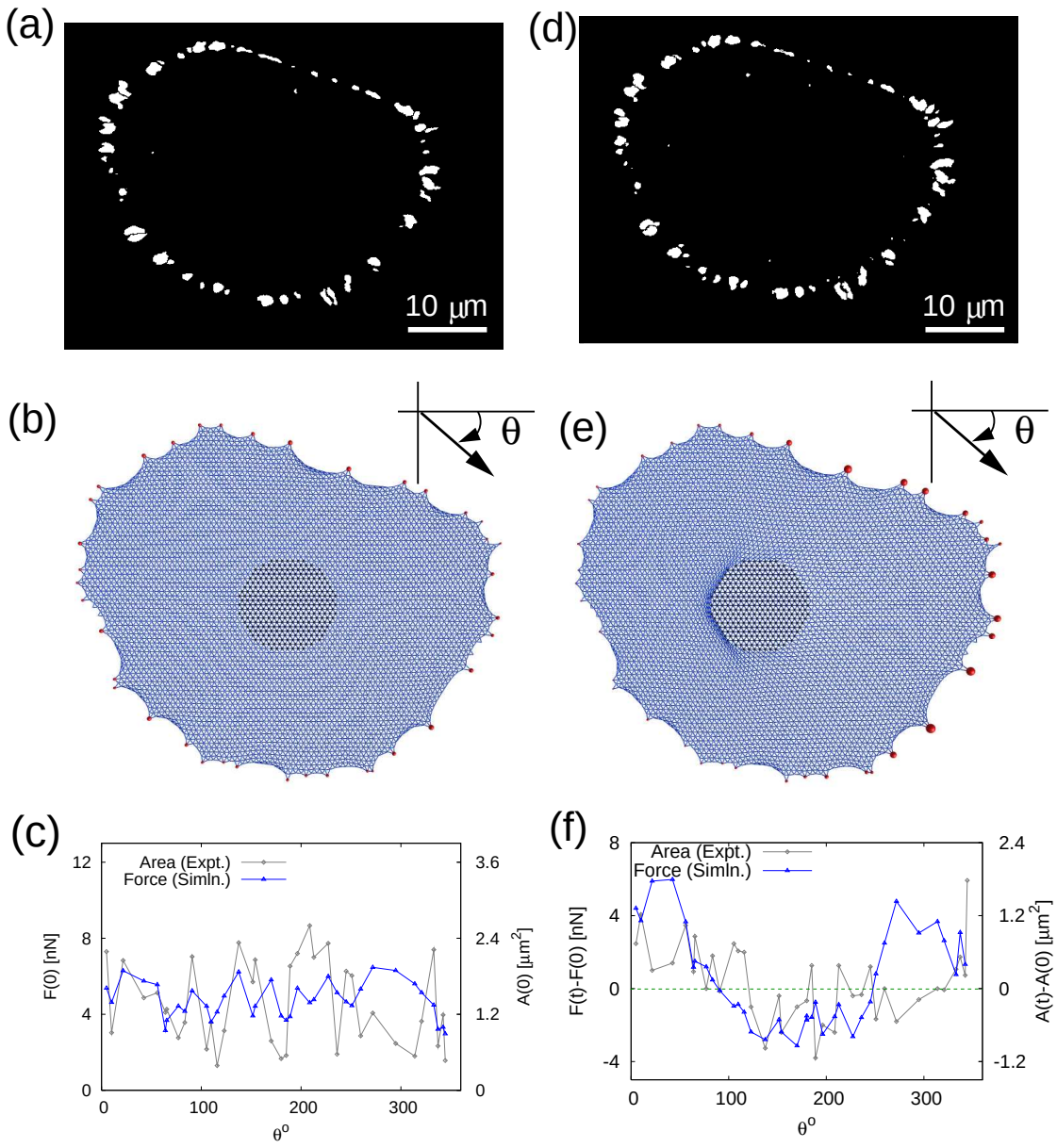

FIG. 5: Comparision of experiment and model predictions for a third set of data. (a) and (b) are the experimental and simulation snapshots of the prestressed cell before pulling, respectively. (c) In order to compare experiment and simulation, we assume that the size of the experimentally measured FA area is proportional to the pulling force on it. The blue line represents the forces at the adhesions predicted by the computer simulations and the gray line represents the experimentally measured areas of the contacts (RMSD = 2.12 nN). (d-f) Same data but 10 min after the pillar has been laterally shifted to the left. In (f), the differences in forces and areas are shown relatively to the situation before pulling (RMSD = 2.60 nN).